

CLAIMS

WHAT IS CLAIMED IS:

1. An ink delivery apparatus comprising a chamber configured to contain ink, said chamber having:
a proximal end for connection to said ink delivery apparatus; and
opposing side portions having at least one tapered section configured to support said chamber and to facilitate at least partial controlled collapse of said chamber in response to a negative pressure.
2. The apparatus of claim 1, wherein said chamber further comprises a distal end opposite said proximal end, said distal end being rounded.
3. The apparatus of claim 1, further comprising at least one tapered section defined in each of said opposing side portions.
4. The apparatus of claim 3, wherein each opposing side portion comprises a central portion with thickness of said side portion decreasing to either side of said central portion.
5. The apparatus of claim 1, further comprising rounded side portions at ends of said opposing side portions.
6. The apparatus of claim 1, wherein said chamber comprises an elastomeric material.
7. The apparatus of claim 6, wherein said chamber comprises a EDPM/Butyl material.

8. The apparatus of claim 1, further comprising a fitment coupled to said proximal end of said chamber.

9. The apparatus of claim 8, wherein said fitment further comprises a fluid interconnect.

10. The apparatus of claim 9, wherein said fluid interconnect is configured to fluidly couple a print head and said chamber.

11. The apparatus of claim 10, wherein said chamber comprises an off-axis ink supply.

12. The apparatus of claim 10, wherein said chamber comprises an on-axis ink supply.

13. The apparatus of claim 12, wherein said fitment is configured to be coupled to a print head.

14. The apparatus of claim 1, further comprising a bubble generator in communication with said chamber.

15. The apparatus of claim 14, wherein said bubble generator is configured to limit said negative pressure within said chamber to a pressure equivalent to about 5 inches of water column during an operational period of said apparatus.

16. The apparatus of claim 15, wherein said bubble generator disposed in a fitment connected to said proximal end of said chamber.

17. An ink delivery assembly, comprising:
at least one pressure tuned ink chamber having

a proximal end and a distal end;
a first pair of opposing side portions disposed at least partially between said proximal and distal ends, said first pair of opposing side portions having opposing tapered sections; and
a second pair of opposing side portions disposed at least partially between said proximal and distal ends, said second pair of opposing side portions having opposing rounded sections; and
a fitment coupled to said chamber.

18. The assembly of claim 17, wherein said fitment further comprises a fluid interconnect.

19. The assembly of claim 18, wherein said fluid interconnect is configured to fluidly couple a print head and said chamber.

20. The assembly of claim 19, wherein said fluid interconnect comprises foam and a screen.

21. The assembly or claim 19, wherein said fluid interconnect comprises a septum

22. The assembly of claim 19, wherein said fitment further comprises a second fluid interconnect.

23. The assembly of claim 22, wherein said second fluid interconnect is configured to transmit ink to said chamber and further comprising a plug disposed in said second fluid interconnect.

24. The assembly of claim 19, wherein said chamber comprises an off-axis ink supply.

25. The assembly of claim 19, wherein said chamber comprises an on-axis ink supply.

26. The assembly of claim 19, wherein said fitment is configured to connect directly with a print head.

27. The assembly of claim 17, further comprising a bubble generator in communication with said chamber.

28. The assembly of claim 27, wherein said bubble generator is configured to limit said negative pressure within said chamber to a pressure equivalent to about 5 inches of water column during an operational period of said apparatus.

29. The assembly of claim 28, wherein said bubble generator is disposed in said fitment.

30. The assembly of claim 17, wherein said apparatus further comprises a plurality of pressure tuned ink chambers.

31. The assembly of claim 30, wherein said plurality of pressure tuned ink chambers comprises three chambers.

32. The assembly of claim 30, wherein said plurality of pressure tuned ink chambers comprises a plurality of ink colors, each color being separately contained within one of said plurality of chambers.

33. The assembly of claim 30, further comprising a sealing gasket disposed at least partially between said plurality of chambers and said fitment.

34. The assembly of claim 30, wherein said fitment is configured to be coupled to a print head.

35. A print device, comprising:
at least one pressure tuned ink chamber having
a proximal end and a distal end;
a first pair of opposing side portions disposed at least partially between
said proximal and distal ends, said first pair of opposing side portions having at
least one pair of opposing tapered sections,
a second pair of opposing side portions disposed at least partially
between said proximal and distal ends, said second pair of opposing side
portions having opposing rounded sections, and
a fitment coupled with said chamber having a fluid interconnect; and
a print head coupled to said fitment.

36. The device of claim 35, further comprising a bubble generator in
said fitment, wherein said bubble generator is configured to provide a
substantially constant pressure equivalent to about 5" of water column.

37. The device of claim 35, wherein said chamber is configured to at
least partially collapse in response to a negative pressure to maintain said
negative pressure within a determined range, wherein said range is
substantially equivalent to pressures of between about 2" and 5" inches of water
column.

38. The device of claim 35, wherein said opposing tapered sections
each comprise central portion with thickness of said tapered sections
decreasing to either side of said central portion.

39. The device of claim 35, wherein said assembly further comprises
a plurality of pressure tuned ink chambers.

40. The device of claim 39, wherein said plurality of pressure tuned ink chambers comprises three pressure tuned ink chambers.

41. The device of claim 40, wherein said plurality of pressure tuned ink chambers comprises a plurality of ink colors, each color being separately contained within one of said plurality of pressure tuned ink chambers.

42. The device of claim 41, further comprising a sealing gasket disposed at least partially between said plurality of pressure tuned ink chambers and said fitment.

43. The device of claim 35, wherein said fluid interconnect is configured to fluidly couple a print head and said chamber, and further comprising a second fluid interconnect, said second fluid interconnect being configured to fluidly couple an ink supply and said chamber.

44. The device of claim 35, wherein said chamber comprises an off-axis ink supply.

45. The device of claim 35, wherein said chamber comprises an on-axis ink supply.

46. The device of claim 35, wherein said fitment is configured to directly couple with a print head.

47. An ink delivery apparatus, comprising:
a fitment having a fluid interconnect;
a pressure tuned ink chamber formed of an elastomeric material,
wherein said pressure tuned ink chamber is coupled to said fitment;
a bubble generator disposed in said fitment;

whereby said pressure tuned ink chamber and said bubble generator are configured to regulate said backpressure within said ink chamber without the use of additional pressure regulating mechanisms.

48. The device of claim 47, wherein said chamber is configured to at least partially collapse in response to a negative pressure to maintain said negative pressure within a determined range, wherein said range is substantially equivalent to pressures of between about 2" and 5" inches of water column.

49. The device of claim 47, wherein said opposing tapered sections each comprise central portion with thickness of said tapered sections decreasing to either side of said central portion.

50. The device of claim 47, wherein said assembly further comprises a plurality of pressure tuned ink chambers.

51. The device of claim 50, wherein said plurality of pressure tuned ink chambers comprises three pressure tuned ink chambers.

52. The device of claim 51, wherein said plurality of pressure tuned ink chambers comprises a plurality of ink colors, each color being separately contained within one of said plurality of pressure tuned ink chambers.

53. The device of claim 52, further comprising a sealing gasket disposed at least partially between said plurality of pressure tuned ink chambers and said fitment.

54. The device of claim 47, wherein said fluid interconnect is configured to fluidly couple a print head and said chamber, and further

comprising a second fluid interconnect, said second fluid interconnect being configured to fluidly couple an ink supply and said chamber.

55. The device of claim 54, wherein said chamber comprises an off-axis ink supply.

56. The device of claim 47, wherein said chamber comprises an on-axis ink supply.

57. The device of claim 47, wherein said fitment is configured to directly couple with a print head.

58. A method of delivering liquid ink, comprising:
providing at least one pressure tuned ink chamber containing an ink;
establishing a negative pressure in said chamber;
supplying said ink to a print head;
regulating a level of said negative pressure within a pre-determined range while at least partially resiliently collapsing a portion of said chamber in response to said negative pressure.

59. The method of claim 58, wherein said regulating negative pressure comprises substantially resiliently collapsing said chamber over said pre-determined range of said negative pressure.

60. The method of claim 59, wherein said regulating negative pressure further comprises operating a bubbler in said chamber at an upper pressure limit of said pre-determined range.

61. The method of claim 58, further comprising monitoring a level of ink in said chamber.

62. The method of claim 58, further comprising providing notification of a substantial increase in said negative pressure.

63. The method of claim 58, further comprising providing a plurality of said pressure tuned ink supply chambers.

64. A system for delivering an ink supply, comprising:
supply means for supplying at least one ink to a print head;
means for establishing a negative pressure in said supply means; and
means for at least partially resiliently collapsing said supply means in order to regulate said negative pressure within a pre-determined range.

65. The system of claim 64, further comprising means for monitoring a level of said negative pressure.

66. The system of claim 65, further comprising means for notifying a user of a sudden increase in said negative pressure.

67. The system of claim 64, wherein said supply means comprises a collapsible, pressure tuned ink chamber.

68. The system of claim 67, wherein said means for at least partially resiliently collapsing said supply means comprise opposing tapered side portions of said ink chamber, wherein said opposing tapered side portions each have a central portion with thickness of said side portions decreasing to either side of said central portion.